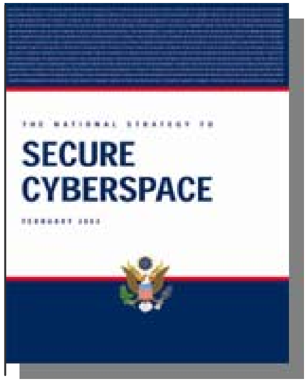


THE NATIONAL STRATEGY TO

SECURE CYBERSPACE

FEBRUARY 2003

Software Assurance

A Strategic Initiative of the U.S. Department of Homeland Security to Promote Integrity, Security, and Reliability in Software

BUILDING SECURITY IN

SOFTWARE ASSURANCE

Collaboratively Advancing Strategies to Mitigate Software Supply Chain Risks

30 July 2009

Homeland Security

Joe Jarzombek, PMP, CSSLP
Director for Software Assurance
National Cyber Security Division
Office of the Assistant Secretary for
Cybersecurity and Communications

DHS NCSD Software Assurance (SwA) Program

Through public-private collaboration promotes security and resilience of software throughout the lifecycle; focused on reducing exploitable software weaknesses and addressing means to improve capabilities that routinely develop, acquire, and deploy resilient software products.

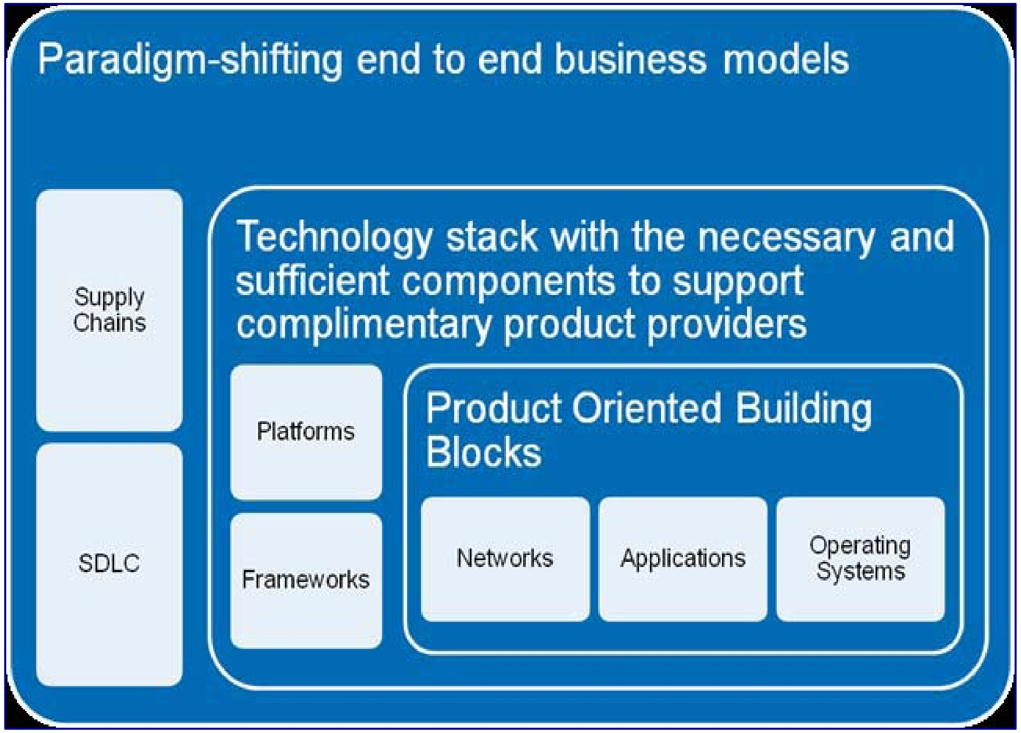
- **Serves as a focal point for interagency public-private collaboration to enhance development and acquisition processes and capability benchmarking to address software security needs.**
  - Hosts interagency Software Assurance Forums, Working Groups and training to provide public-private collaboration in advancing software security and providing publicly available resources.
  - Provides collaboratively developed, peer-reviewed information resources on Software Assurance, via journals, guides & on-line resources suitable for use in education, training, and process improvement.
  - Provides input and criteria for leveraging international standards and maturity models used for process improvement and capability benchmarking of software suppliers and acquisition organizations.
- **Enables software security automation and measurement capabilities through use of common indexing and reporting capabilities for malware, exploitable software weaknesses, and common attacks which target software.**
  - Collaborates with the National Institute of Standards and Technology, international standards organizations, and tool vendors to create standards, metrics and certification mechanisms from which tools can be qualified for software security verification.
  - Manages programs to facilitate the adoption of Malware Attribute Enumeration Classification (MAEC), Common Weakness Enumeration (CWE), and Common Attack Pattern Enumeration and Classification (CAPEC).

IT/software security risk landscape is a convergence between “defense in depth” and “defense in breadth”

Enterprise Risk Management and Governance are security motivators

Acquisition could be considered the beginning of the lifecycle; not development

> “In the digital age, sovereignty is demarcated not by territorial frontiers but by supply chains.”
>
> – Dan Geer, CISO In-Q-Tel



Paradigm-shifting end to end business models

Supply Chains

SDLC

Technology stack with the necessary and sufficient components to support complimentary product providers

Platforms

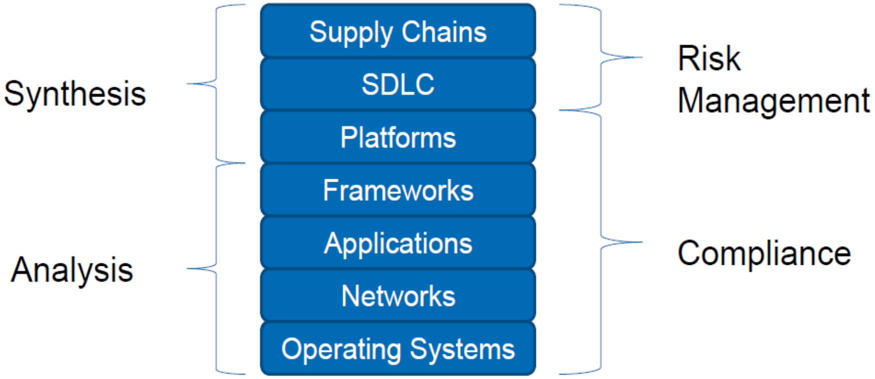
Frameworks

Product Oriented Building Blocks

Networks

Applications

Operating Systems



Synthesis

Analysis

Supply Chains

SDLC

Platforms

Frameworks

Applications

Networks

Operating Systems

Risk Management

Compliance

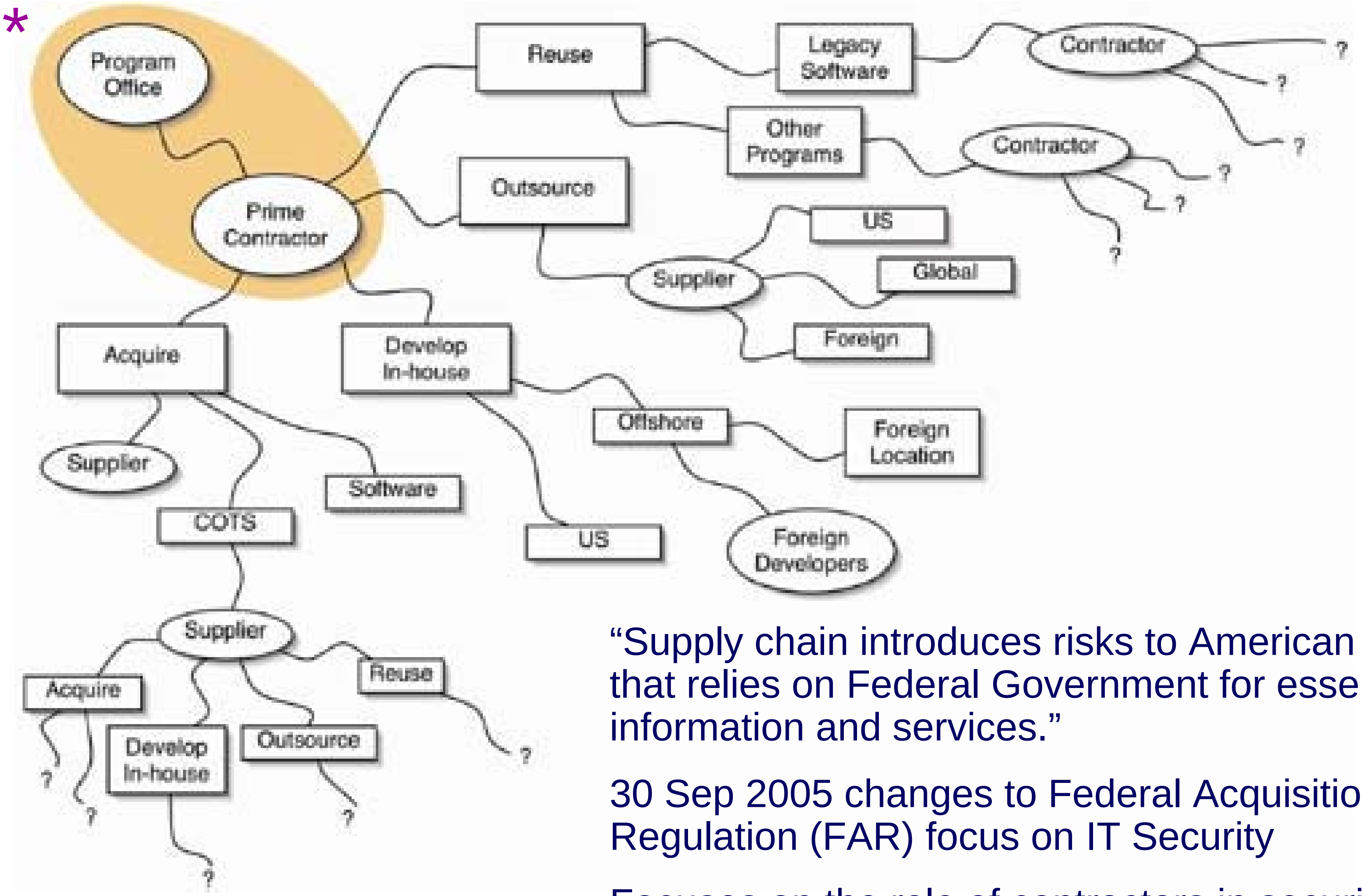
Software Assurance provides a focus for:

-- Secure Software Components,

-- Security in the SDLC and

-- Software Supply Chain Risk Management

*



"Supply chain introduces risks to American society that relies on Federal Government for essential information and services."

30 Sep 2005 changes to Federal Acquisition Regulation (FAR) focus on IT Security

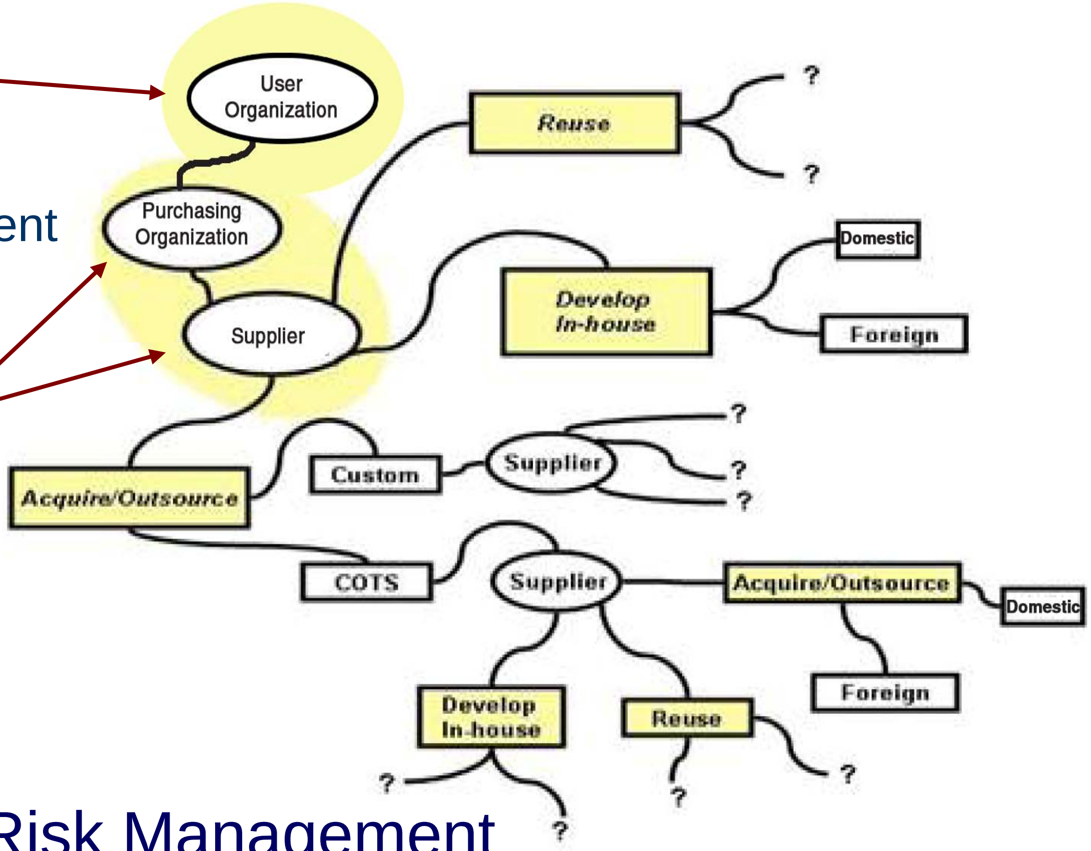
Focuses on the role of contractors in security as Federal agencies outsource various IT functions.

Homeland Security

"Scope of Supplier Expansion and Foreign Involvement" graphic in DACS www.softwaretechnews.com Secure Software Engineering, July 2005 article "Software Development Security: A Risk Management Perspective" synopsis of May 2004 GAO-04-678 report "Defense Acquisition: Knowledge of Software Suppliers Needed to Manage Risks"

Risk Management (Enterprise <=> Project):
Shared Processes & Practices // Different Focuses

- Enterprise-Level:
  - Regulatory compliance
  - Changing threat environment
  - Business Case
- Program/Project-Level:
  - Cost
  - Schedule
  - Performance



Software Supply Chain Risk Management traverses enterprise and program/project interests

Security is a Requisite Quality Attribute: Vulnerable Software Enables Exploitation

- Rather than attempt to break or defeat network or system security, hackers are opting to target application software to circumvent security controls.
  - ❑ **75% of hacks occurred at application level**
    - "90% of software attacks were aimed at application layer" (Gartner & Symantec, June 2006)
  - ❑ most exploitable software vulnerabilities are attributable to non-secure coding practices (and not identified in testing).
- Functional correctness must be exhibited even when software is subjected to abnormal and hostile conditions

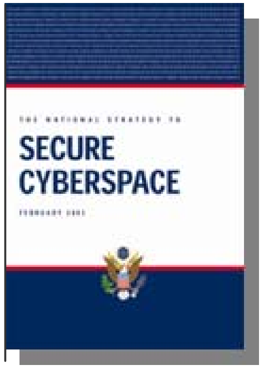
Software applications with exploitable vulnerabilities
SECURITY
Software applications with exploitable vulnerabilities

In an era riddled with asymmetric cyber attacks, claims about system reliability, integrity & safety must include provisions for built-in security of the enabling software.

Software Assurance "End State" Objectives…

- **Government, in collaboration with industry / academia, raised expectations for product assurance with requisite levels of integrity and security:**
  - Helped advance more comprehensive software assurance diagnostic capabilities to mitigate risks stemming from exploitable vulnerabilities and weaknesses;
  - Collaboratively advanced use of software security measurement & benchmarking schemes
  - Promoted use of methodologies and tools that enabled security to be part of normal business.
- **Acquisition managers & users factored risks posed by the software supply chain as part of the trade-space in risk mitigation efforts:**
  - Information on suppliers' process capabilities (business practices) would be used to determine security risks posed by the suppliers' products and services to the acquisition project and to the operations enabled by the software.
  - Information about evaluated products would be available, along with responsive provisions for discovering exploitable vulnerabilities, and products would be securely configured in use.
- **Suppliers delivered quality products with requisite integrity and made assurance claims about the IT/software safety, security and dependability:**
  - Relevant standards would be used from which to base business practices & make claims;
  - Qualified tools used in software lifecycle enabled developers/testers to mitigate security risks;
  - Standards and qualified tools would be used to certify software by independent third parties;
  - IT/software workforce had requisite knowledge/skills for developing secure, quality products.

DHS Software Assurance Program Overview



- Program established in response to the National Strategy to Secure Cyberspace - Action/Recommendation 2-14:

  > *"DHS will facilitate a national public-private effort to promulgate best practices and methodologies that promote integrity, security, and reliability in software code development, including processes and procedures that diminish the possibilities of erroneous code, malicious code, or trap doors that could be introduced during development."*

- DHS Program goals promote the **security and resilience** of software across the development, acquisition, and operational life cycle

- DHS Software Assurance (SwA) program is scoped to address:
  - **Trustworthiness** - No exploitable vulnerabilities or malicious logic exist in the software, either intentionally or unintentionally inserted,
  - **Dependability (Correct and Predictable Execution)** - Justifiable confidence that software, when executed, functions as intended,
  - **Survivability** - If compromised, damage to the software will be minimized, and it will recover quickly to an acceptable level of operating capacity;
  - **Conformance** – Planned, systematic set of multi-disciplinary activities that ensure processes/products conform to requirements, standards/procedures.

Homeland Security

See Wikipedia.org for "Software Assurance" - CNSS Instruction No. 4009, "National Information Assurance Glossary," Revised 2006, defines Software Assurance as: "the level of confidence that software is free from vulnerabilities, either intentionally designed into the software or accidentally inserted at anytime during its lifecycle, and that the software functions in the intended manner".

BUILDING SECURITY IN
SOFTWARE ASSURANCE

Software Assurance Forum & Working Groups*

… encourage the production, evaluation and acquisition of better quality and more secure software through targeting

People	Processes	Technology	Acquisition
Developers and users education & training	Sound practices, standards, & practical guidelines for secure software development	Security test criteria, diagnostic tools, common enumerations, SwA R&D, and SwA measurement	Software security improvements through due-diligence questions, specs and guidelines for acquisitions/ outsourcing

Products and Contributions

Build Security In - https://buildsecurityin.us-cert.gov and SwA community resources & info clearinghouse

SwA Common Body of Knowledge (CBK) & Glossary
Organization of SwSys Security Principles/Guidelines
SwA Developers' Guide on Security-Enhancing SDLC

Software Security Assurance State of the Art Report
Systems Assurance Guide (via DoD and NDIA)

SwA-related standards – ISO/IEC JTC1 SC7/27/22, IEEE CS, OMG, TOG, & CMM-based Assurance

Practical Measurement Framework for SwA/InfoSec
Making the Business Case for Software Assurance

SwA Metrics & Tool Evaluation (with NIST)
SwA Ecosystem w/ DoD, NSA, NIST, OMG & TOG
NIST Special Pub 500 Series on SwA Tools

Common Weakness Enumeration (CWE) dictionary
Common Attack Pattern Enumeration (CAPEC)

SwA in Acquisition: Mitigating Risks to Enterprise
Software Project Management for SwA SOAR

Homeland Security

* SwA Forum is part of Cross-Sector Cyber Security Working Group (CSCSWG) established under auspices of the Critical Infrastructure Partnership Advisory Council (CIPAC) that provides legal framework for participation.

SwA Collaboration for Content & Peer Review

Build Security In

Setting a higher standard for software assurance

Sponsored by DHS National Cyber Security Division

BSI https://buildsecurityin.us-cert.gov focuses with a thrust to make Software Security a normal part of Software Engineering

Software Assurance

Community Resources and Information Clearinghouse

Sponsored by DHS National Cyber Security Division

SwA Community Resources and Information Clearinghouse (CRIC)

https://buildsecurityin.us-cert.gov/swa/ focuses on all contributing disciplines, practices and methodologies that advance risk mitigation efforts to enable greater resilience of software/cyber assets.

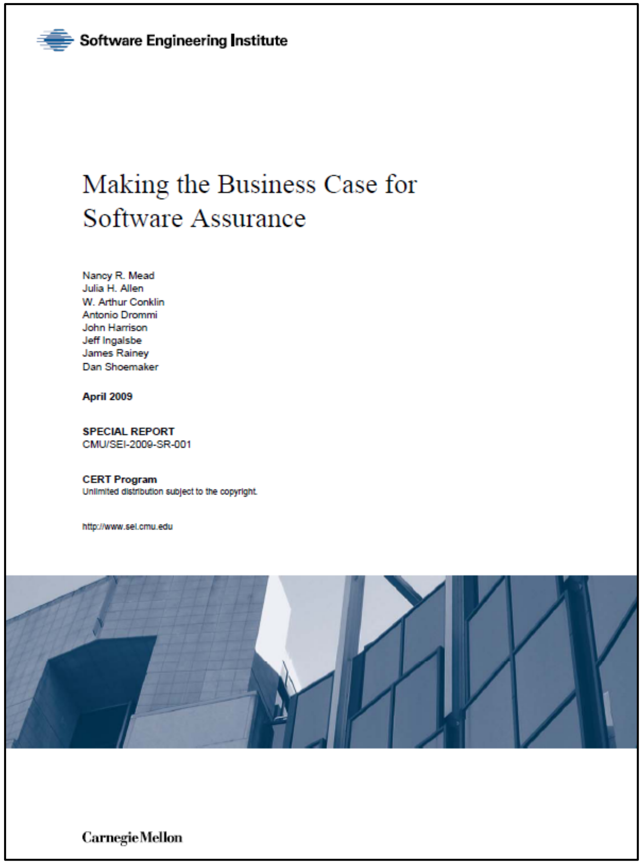
The SwA CRIC provides a primary resource for SwA Working Groups.

Where applicable, SwA CRIC & BSI provide relevant links to each other.

Business Case for Software Assurance

April 2009 SwA Report provides background, context and examples:

- Motivators
- Cost/Benefit Models Overview
- Measurement
- Risk
- Prioritization
- Process Improvement & Secure Software
- Globalization
- Organizational Development
- Case Studies and Examples



Software Engineering Institute

Making the Business Case for
Software Assurance

Nancy R. Mead
Julia H. Allen
W. Arthur Conklin
Antonio Drommi
John Harrison
Jeff Ingalsbe
James Rainey
Dan Shoemaker

April 2009

SPECIAL REPORT
CMU/SEI-2009-SR-001

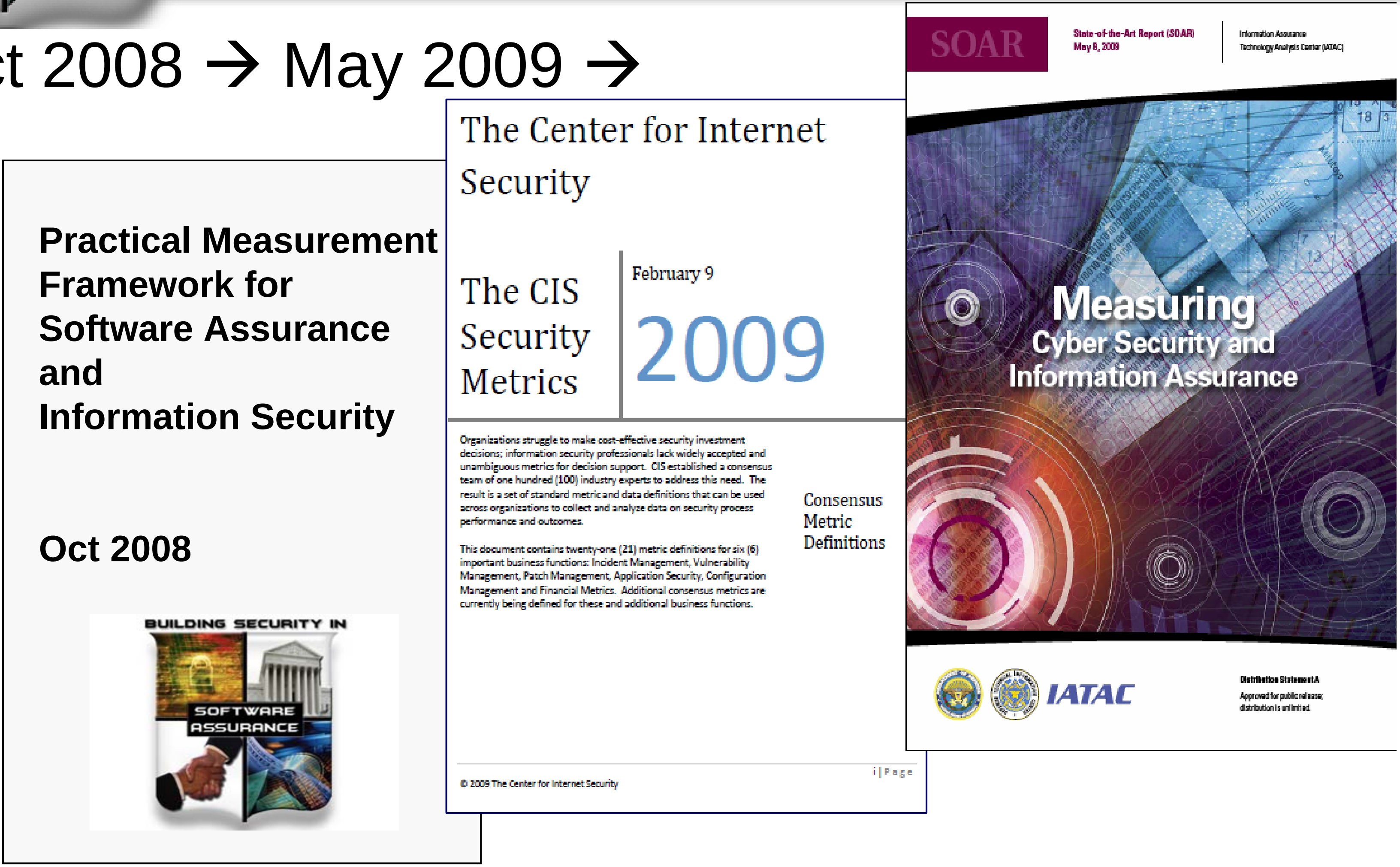
CERT Program
Unlimited distribution subject to the copyright.

http://www.sei.cmu.edu

CarnegieMellon

Security Measurement Resources

Oct 2008 → May 2009 →



Practical Measurement Framework for Software Assurance and Information Security

Oct 2008

BUILDING SECURITY IN

SOFTWARE ASSURANCE

The Center for Internet Security

The CIS Security Metrics

February 9

2009

Organizations struggle to make cost-effective security investment decisions; information security professionals lack widely accepted and unambiguous metrics for decision support. CIS established a consensus team of one hundred (100) industry experts to address this need. The result is a set of standard metric and data definitions that can be used across organizations to collect and analyze data on security process performance and outcomes.

This document contains twenty-one (21) metric definitions for six (6) important business functions: Incident Management, Vulnerability Management, Patch Management, Application Security, Configuration Management and Financial Metrics. Additional consensus metrics are currently being defined for these and additional business functions.

Consensus Metric Definitions

© 2009 The Center for Internet Security

i | Page

SOAR

State-of-the-Art Report (SOAR)
May 8, 2009

Information Assurance
Technology Analysis Center (IATAC)

Measuring
Cyber Security and
Information Assurance

IATAC

Distribution Statement A

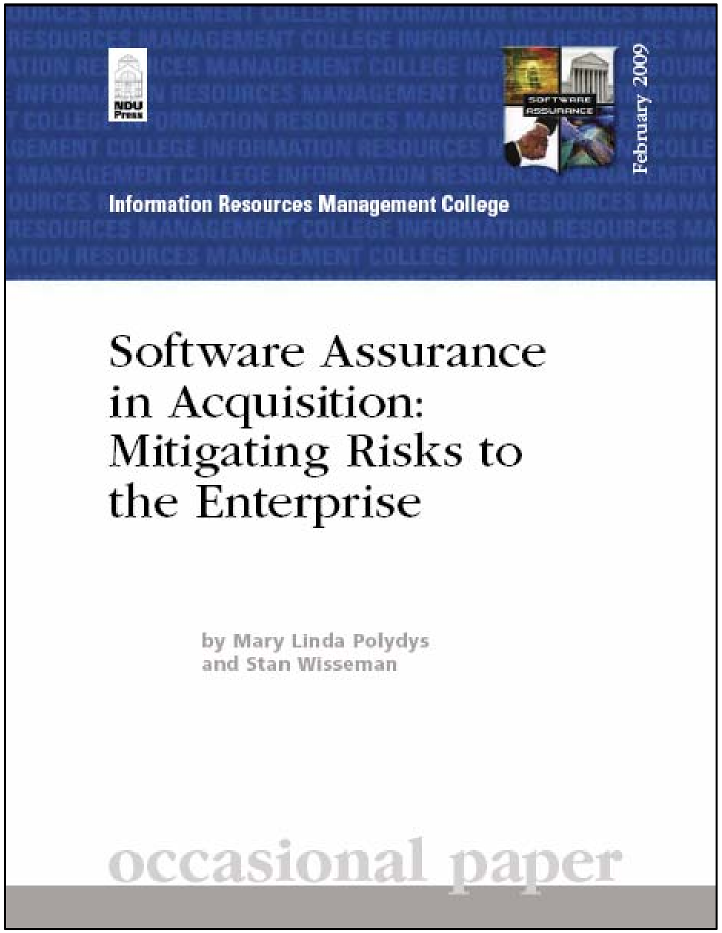
Approved for public release;
distribution is unlimited.

“Software Assurance in Acquisition:

Mitigating Risks to the Enterprise“

Version 1.0, Oct 2008, available for community use

published by National Defense University Press, Feb 2009



NDU Press

February 2009

SOFTWARE ASSURANCE

Information Resources Management College

Software Assurance in Acquisition: Mitigating Risks to the Enterprise

by Mary Linda Polydys
and Stan Wisseman

occasional paper

SwA Acquisition & Outsourcing Handbook

February 2009

Information Resources Management College

Software Assurance in Acquisition: Mitigating Risks to the Enterprise

by Mary Linda Polydys and Stan Wisseman

occasional paper

Software Assurance (SwA) Pocket Guide Series

SwA in Acquisition & Outsourcing

- Contract Language for Integrating Software Security into the Acquisition Life Cycle
- Software Supply Chain Risk Management and Due-Diligence

SwA in Development

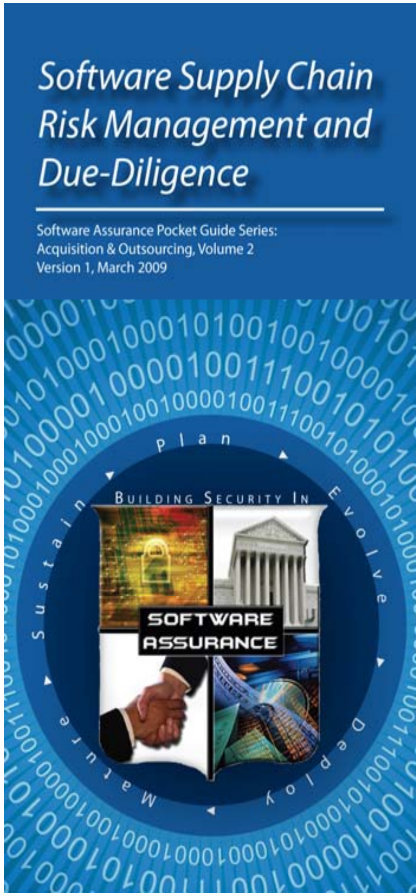
- Integrating Security into the Software Development Life Cycle
- Key Practices for Mitigating the Most Egregious Exploitable Software Weaknesses
- Risk-based Software Security Testing
- Requirements and Analysis for Secure Software
- Architecture and Design Considerations for Secure Software
- Secure Coding and Software Construction
- Security Considerations for Technologies, Methodologies & Languages

SwA Life Cycle Support

- SwA in Education, Training and Certification
- Secure Software Distribution, Deployment, and Operations
- Code Transparency & Software Labels
- Assurance Case Management
- Secure Software Environment and Assurance EcoSystem

SwA Measurement and Information Needs

- Making Software Security Measurable
- Practical Measurement Framework for SwA and InfoSec
- SwA Business Case and Return on Investment



Software Supply Chain Risk Management and Due-Diligence

Software Assurance Pocket Guide Series:
Acquisition & Outsourcing, Volume 2
Version 1, March 2009

SwA Pocket Guides and SwA-related documents are collaboratively developed with peer review; they are subject to update and are freely available for download via the DHS Software Assurance Community Resources and Information Clearinghouse at https://buildsecurityin.us-cert.gov/swa (see SwA Resources)

Software Supply Chain Risk Management and Due-Diligence -- Table 1 –SwA Concern Categories

SwA Concern Categories	Risks	Purpose for Questions
Software History and Licensing **Development Process Management** **Software Security Training and** **Planning and Requirements** **Architecture and Design** **Software Development** **Built-in Software Defenses** **Component Assembly** **Testing** **Software Manufacture and Packaging** **Installation** **Assurance Claims and Evidence** **Support** **Software Change Management** **Timeliness of Vulnerability Mitigation** **Individual Malicious Behavior** **Security “Track Record”** **Financial History and Status** **Organizational History** **Foreign Interests and Influences** **Service Confidentiality Policies** **Operating Environment for Services** **Security Services and Monitoring**		

Table 1 –SwA Concern Categories -- (with interests relevant to security and privacy)

SwA Concern Categories	Risks	Purpose for Questions
Service Confidentiality Policies	Without policies to enforce client data confidentiality/ privacy, acquirer’s data could be at risk without service supplier liability.	To determine the service provider’s confidentiality and privacy policies and ensure their enforcement.

Table 3 - Questions for Hosted Applications

No.	Questions
	Service Confidentiality Policies
1	What are the customer confidentiality policies? How are they enforced?
2	What are the customer privacy policies? How are they enforced?
3	What are the policies and procedures used to protect sensitive information from unauthorized access? How are the policies enforced?
4	What are the set of controls to ensure separation of data and security information between different customers that are physically located in the same data center? On the same host server?
	Operating Environment for Services
5	Who configures and deploys the servers? Are the configuration procedures available for review, including documentation for all registry settings?
7	What are the data backup policies and procedures? How frequently are the backup procedures verified?
11	What are the agents or scripts executing on servers of hosted applications? Are there procedures for reviewing the security of these scripts or agents?
12	What are the procedures and policies used to approve, grant, monitor and revoke access to the servers? Are audit logs maintained?
13	What are the procedures and policies for handling and destroying sensitive data on electronic and printed media?
15	What are the procedures used to approve, grant, monitor, and revoke file permissions for production data and executable code?

Sponsored by
DHS National Cyber Security Division/US-CERT

NIST
National Institute of Standards and Technology

National Vulnerability Database

automating vulnerability management, security measurement, and compliance checking

National Vulnerability Database (NVD) Version 2.2 -- http://nvd.nist.gov/

- NVD is the U.S. government repository of standards based vulnerability management data represented using the Security Content Automation Protocol (SCAP).
- This data enables automation of vulnerability management, security measurement, & compliance.
- NVD includes databases of security checklists, security related software flaws, misconfigurations, product names, and impact metrics. NVD supports the Information Security Automation Program.

Federal Desktop Core Configuration settings (FDCC)

- NVD contains content (and pointers to tools) for performing configuration checking of systems implementing the FDCC using the Security Content Automation Protocol (SCAP).
- FDCC Checklists are available to be used with SCAP FDCC Capable Tools -- available via NVD.

NVD Primary Resources

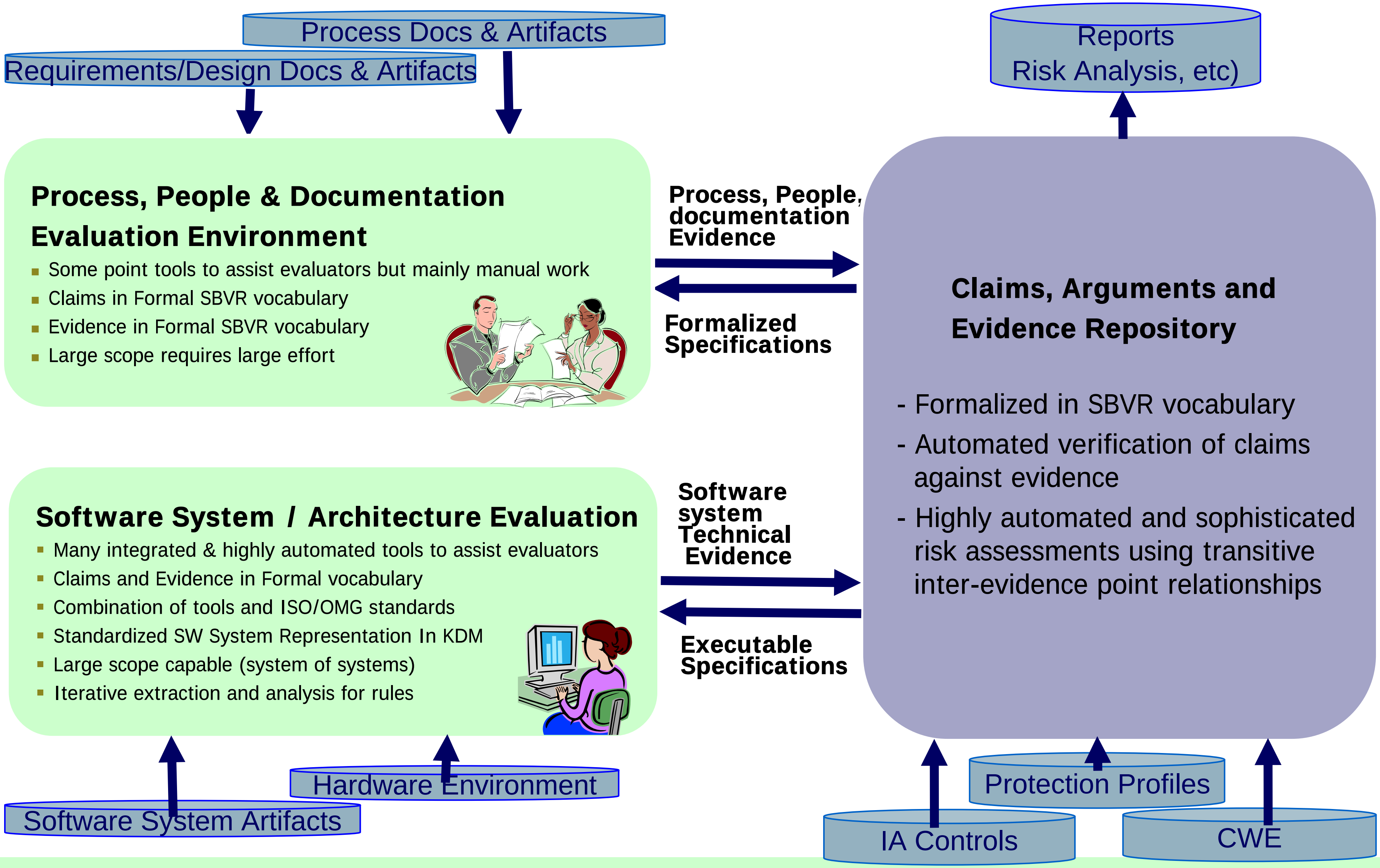
- Vulnerability Search Engine (CVE software flaws and CCE misconfigurations)
- National Checklist Program (automatable security configuration guidance in XCCDF and OVAL)
- SCAP (program and protocol that NVD supports) and SCAP Compatible Tools
- SCAP Data Feeds (CVE, CCE, CPE, CVSS, XCCDF, OVAL)
- Product Dictionary (CPE) and Impact Metrics (CVSS)
- Common Weakness Enumeration (CWE)

Standard Enumerations for Addressing Common Weaknesses and Common Attack Patterns

- DHS NCSD Software Assurance program co-sponsors the Common Weakness Enumeration (CWE) [http://cwe.mitre.org/] and the Common Attack Pattern Enumeration and Classification (CAPEC) [http://capec.mitre.org/]
  - To more effectively understand their risk exposure, consumers need to understand exploitable weaknesses in software before put into use and throughout the lifecycle.
  - These are standard enumerations and community knowledge resources.
  - These enable consumers to be better informed about the resilience and security of software we acquire and use.
- As a standard enumeration, CWE provides a unified, measurable set of exploitable software weaknesses that now enables more effective discussion, description, selection and use of software security tools and services that can find these weaknesses in source code (with one intent to discover them before the code is put into use).

Software Assurance Ecosystem: The Formal Framework

The value of formalization extends beyond software systems to include related software system process, people and documentation



Process Docs & Artifacts

Requirements/Design Docs & Artifacts

Process, People & Documentation Evaluation Environment

- Some point tools to assist evaluators but mainly manual work
- Claims in Formal SBVR vocabulary
- Evidence in Formal SBVR vocabulary
- Large scope requires large effort

Process, People, documentation Evidence

Formalized Specifications

Software System / Architecture Evaluation

- Many integrated & highly automated tools to assist evaluators
- Claims and Evidence in Formal vocabulary
- Combination of tools and ISO/OMG standards
- Standardized SW System Representation In KDM
- Large scope capable (system of systems)
- Iterative extraction and analysis for rules

Software system Technical Evidence

Executable Specifications

Hardware Environment

Software System Artifacts

Reports
Risk Analysis, etc)

Claims, Arguments and Evidence Repository

- Formalized in SBVR vocabulary
- Automated verification of claims against evidence
- Highly automated and sophisticated risk assessments using transitive inter-evidence point relationships

Protection Profiles

IA Controls

CWE

SwA processes & practices are moving toward more disciplined, less subjective with more automated, comprehensive tooling and formalized specifications

Software Supply Chain Management is a National Security Issue

- Adversaries can gain “intimate access” to target systems, especially in a global supply chain that offers limited transparency
- Advances in computer science and technology will always outpace the ability of government and industry to react with new policies and standards
  - National security policies must conform with international laws and agreements while preserving a nation’s rights and freedoms, and protecting a nation’s self interests and economic goals
  - Forward-looking policies can adapt to the new world of global supply chains
  - International standards must mature to better address supply chain risk management, IT security, systems & software assurance
- Software suppliers and buyers can take more deliberate actions to security-enhance their processes and practices to mitigate risks
- Government & Industry have significant leadership roles in solving this

Globalization will not be reversed;
this is how we conduct business

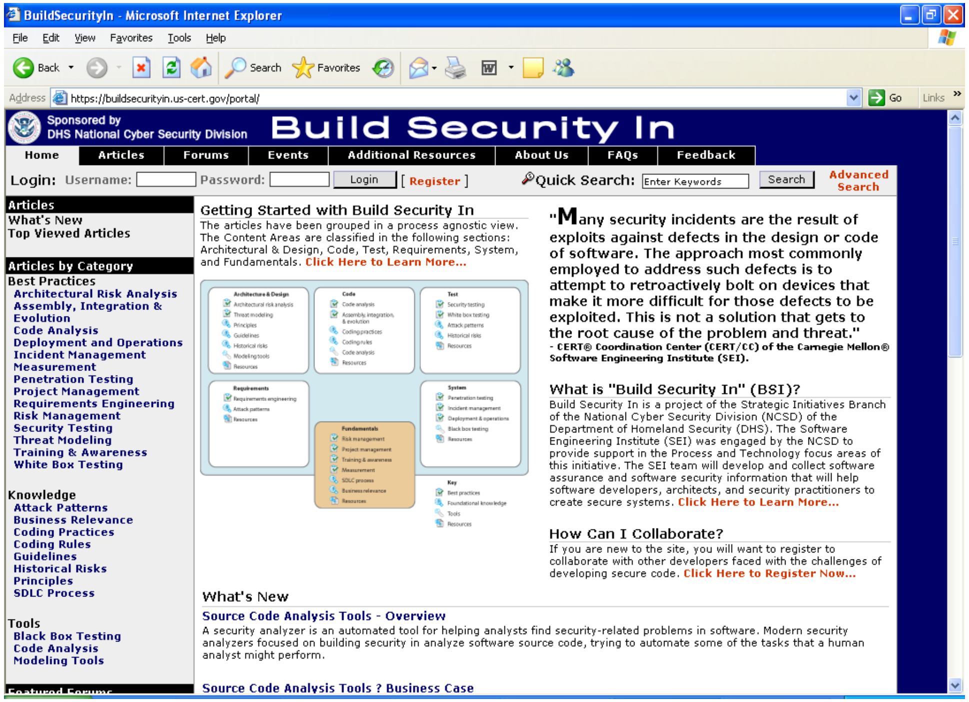
Next SwA Forum 2-6 Nov 2009 in the Washington DC metro area
Next SwA Working Group Session 15-17 Dec 2009 at MITRE, McLean VA

SwA Community Resources & Information Clearinghouse

https://buildsecurityin.us-cert.gov/swa/

Build Security In web site

https://buildsecurityin.us-cert.gov


BuildSecurityIn - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
Go
Links

https://buildsecurityin.us-cert.gov/portal/

Sponsored by DHS National Cyber Security Division

Build Security In

Articles
What's New
Top Viewed Articles

Articles by Category
Best Practices
Architectural Risk Analysis
Assembly, Integration & Evolution
Code Analysis
Deployment and Operations
Incident Management
Measurement
Penetration Testing
Project Management
Requirements Engineering
Risk Management
Security Testing
Threat Modeling
Training & Awareness
White Box Testing

Knowledge
Attack Patterns
Business Relevance
Coding Practices
Coding Rules
Guidelines
Historical Risks
Principles
SDLC Process

Tools
Black Box Testing
Code Analysis
Modeling Tools

Featured Forums

Getting Started with Build Security In

The articles have been grouped in a process agnostic view. The Content Areas are classified in the following sections: Architectural & Design, Code, Test, Requirements, System, and Fundamentals. Click Here to Learn More...

"Many security incidents are the result of exploits against defects in the design or code of software. The approach most commonly employed to address such defects is to attempt to retroactively bolt on devices that make it more difficult for those defects to be exploited. This is not a solution that gets to the root cause of the problem and threat."
- CERT® Coordination Center (CERT/CC) of the Carnegie Mellon® Software Engineering Institute (SEI).

What is "Build Security In" (BSI)?

Build Security In is a project of the Strategic Initiatives Branch of the National Cyber Security Division (NCSD) of the Department of Homeland Security (DHS). The Software Engineering Institute (SEI) was engaged by the NCSD to provide support in the Process and Technology focus areas of this initiative. The SEI team will develop and collect software assurance and software security information that will help software developers, architects, and security practitioners to create secure systems. Click Here to Learn More...

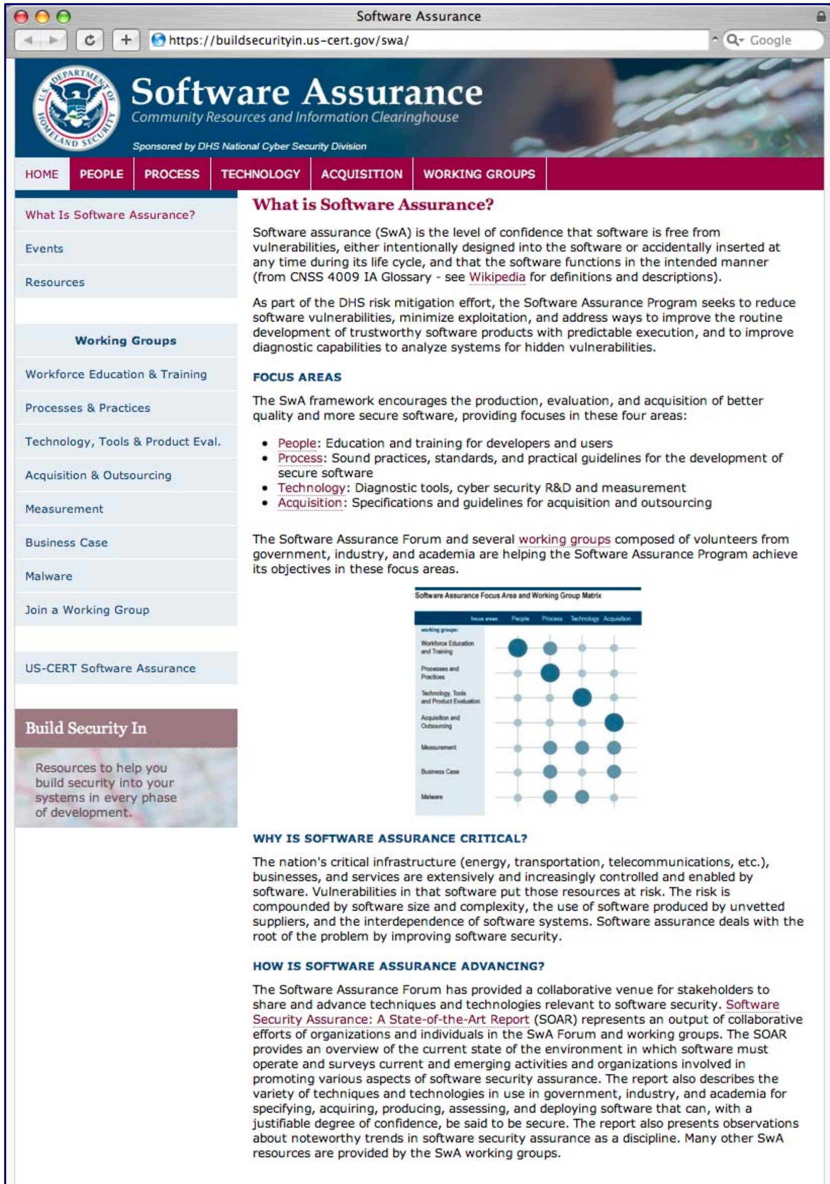
How Can I Collaborate?

If you are new to the site, you will want to register to collaborate with other developers faced with the challenges of developing secure code. Click Here to Register Now...

What's New

Source Code Analysis Tools - Overview
A security analyzer is an automated tool for helping analysts find security-related problems in software. Modern security analyzers focused on building security in analyze software source code, trying to automate some of the tasks that a human analyst might perform.

Source Code Analysis Tools ? Business Case



https://buildsecurityin.us-cert.gov/swa/

Software Assurance
Community Resources and Information Clearinghouse
Sponsored by DHS National Cyber Security Division

What Is Software Assurance?
Events
Resources

Working Groups
Workforce Education & Training
Processes & Practices
Technology, Tools & Product Eval.
Acquisition & Outsourcing
Measurement
Business Case
Malware
Join a Working Group

US-CERT Software Assurance

Build Security In
Resources to help you build security into your systems in every phase of development.

What is Software Assurance?

Software assurance (SwA) is the level of confidence that software is free from vulnerabilities, either intentionally designed into the software or accidentally inserted at any time during its life cycle, and that the software functions in the intended manner (from CNSS 4009 IA Glossary - see Wikipedia for definitions and descriptions).

As part of the DHS risk mitigation effort, the Software Assurance Program seeks to reduce software vulnerabilities, minimize exploitation, and address ways to improve the routine development of trustworthy software products with predictable execution, and to improve diagnostic capabilities to analyze systems for hidden vulnerabilities.

FOCUS AREAS

The SwA framework encourages the production, evaluation, and acquisition of better quality and more secure software, providing focuses in these four areas:

- People: Education and training for developers and users
- Process: Sound practices, standards, and practical guidelines for the development of secure software
- Technology: Diagnostic tools, cyber security R&D and measurement
- Acquisition: Specifications and guidelines for acquisition and outsourcing

The Software Assurance Forum and several working groups composed of volunteers from government, industry, and academia are helping the Software Assurance Program achieve its objectives in these focus areas.

Software Assurance Focus Area and Working Group Matrix
focus areas:
People
Process
Technology
Acquisition
working groups:
Workforce Education and Training
Processes and Practices
Technology, Tools and Product Evaluation
Acquisition and Outsourcing
Measurement
Business Case
Malware

WHY IS SOFTWARE ASSURANCE CRITICAL?

The nation's critical infrastructure (energy, transportation, telecommunications, etc.), businesses, and services are extensively and increasingly controlled and enabled by software. Vulnerabilities in that software put those resources at risk. The risk is compounded by software size and complexity, the use of software produced by unvetted suppliers, and the interdependence of software systems. Software assurance deals with the root of the problem by improving software security.

HOW IS SOFTWARE ASSURANCE ADVANCING?

The Software Assurance Forum has provided a collaborative venue for stakeholders to share and advance techniques and technologies relevant to software security. Software Security Assurance: A State-of-the-Art Report (SOAR) represents an output of collaborative efforts of organizations and individuals in the SwA Forum and working groups. The SOAR provides an overview of the current state of the environment in which software must operate and surveys current and emerging activities and organizations involved in promoting various aspects of software security assurance. The report also describes the variety of techniques and technologies in use in government, industry, and academia for specifying, acquiring, producing, assessing, and deploying software that can, with a justifiable degree of confidence, be said to be secure. The report also presents observations about noteworthy trends in software security assurance as a discipline. Many other SwA resources are provided by the SwA working groups.

Joe Jarzombek, PMP, CSSLP
Director for Software Assurance
National Cyber Security Division
Department of Homeland Security
Joe.Jarzombek@dhs.gov
(703) 235-5126
LinkedIn SwA Mega-Community

BUILDING SECURITY IN
SOFTWARE ASSURANCE

Next SwA Forum 2-6 Nov 2009 in the Washington DC metro area
Next SwA Working Group Session 15-17 Dec 2009 at MITRE, McLean VA

SOFTWARE ASSURANCE FORUM

"Building Security In"

https://buildsecurityin.us-cert.gov/swa

BACK UP SLIDES

Process Agnostic Lifecycle

Touch Points & Artifacts

Architecture & Design

- ☑ Architectural risk analysis
- ☑ Threat modeling
- 🔍 Principles
- 🔍 Guidelines
- 🔍 Historical risks
- 🔧 Modeling tools
- 📄 Resources

Code

- ☑ Code analysis
- ☑ Assembly, integration & evolution
- 🔍 Coding practices
- 🔍 Coding rules
- 🔧 Code analysis
- 📄 Resources

Test

- ☑ Security testing
- ☑ White box testing
- 🔍 Attack patterns
- 🔍 Historical risks
- 📄 Resources

Requirements

- ☑ Requirements engineering
- 🔍 Attack patterns
- 📄 Resources

System

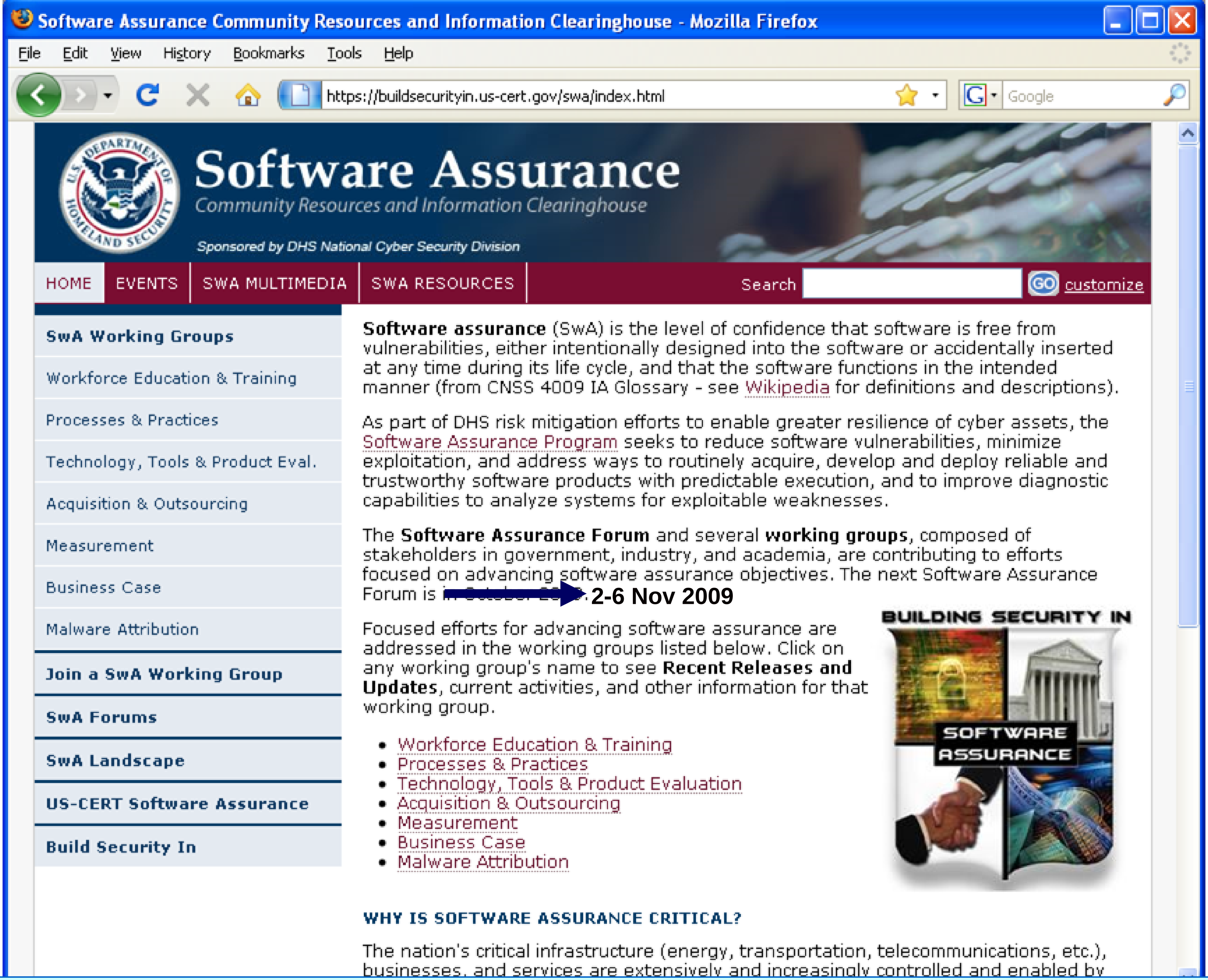
- ☑ Penetration testing
- ☑ Incident management
- ☑ Deployment & operations
- 🔧 Black box testing
- 📄 Resources

Fundamentals

- ☑ Risk management
- ☑ Project management
- ☑ Training & awareness
- ☑ Measurement
- 🔍 SDLC process
- 🔍 Business relevance
- 📄 Resources

Key

- ☑ Best (sound) practices
- 🔍 Foundational knowledge
- 🔧 Tools
- 📄 Resources


Software Assurance Community Resources and Information Clearinghouse - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://buildsecurityin.us-cert.gov/swa/index.html
Google

Software Assurance

Community Resources and Information Clearinghouse

Sponsored by DHS National Cyber Security Division

HOME
EVENTS
SWA MULTIMEDIA
SWA RESOURCES
Search
GO
customize

SwA Working Groups
Workforce Education & Training
Processes & Practices
Technology, Tools & Product Eval.
Acquisition & Outsourcing
Measurement
Business Case
Malware Attribution
Join a SwA Working Group
SwA Forums
SwA Landscape
US-CERT Software Assurance
Build Security In

Software assurance (SwA) is the level of confidence that software is free from vulnerabilities, either intentionally designed into the software or accidentally inserted at any time during its life cycle, and that the software functions in the intended manner (from CNSS 4009 IA Glossary - see Wikipedia for definitions and descriptions).

As part of DHS risk mitigation efforts to enable greater resilience of cyber assets, the Software Assurance Program seeks to reduce software vulnerabilities, minimize exploitation, and address ways to routinely acquire, develop and deploy reliable and trustworthy software products with predictable execution, and to improve diagnostic capabilities to analyze systems for exploitable weaknesses.

The **Software Assurance Forum** and several **working groups**, composed of stakeholders in government, industry, and academia, are contributing to efforts focused on advancing software assurance objectives. The next Software Assurance Forum is ~~in October 2009~~. **2-6 Nov 2009**

Focused efforts for advancing software assurance are addressed in the working groups listed below. Click on any working group's name to see **Recent Releases and Updates**, current activities, and other information for that working group.

- Workforce Education & Training
- Processes & Practices
- Technology, Tools & Product Evaluation
- Acquisition & Outsourcing
- Measurement
- Business Case
- Malware Attribution

WHY IS SOFTWARE ASSURANCE CRITICAL?

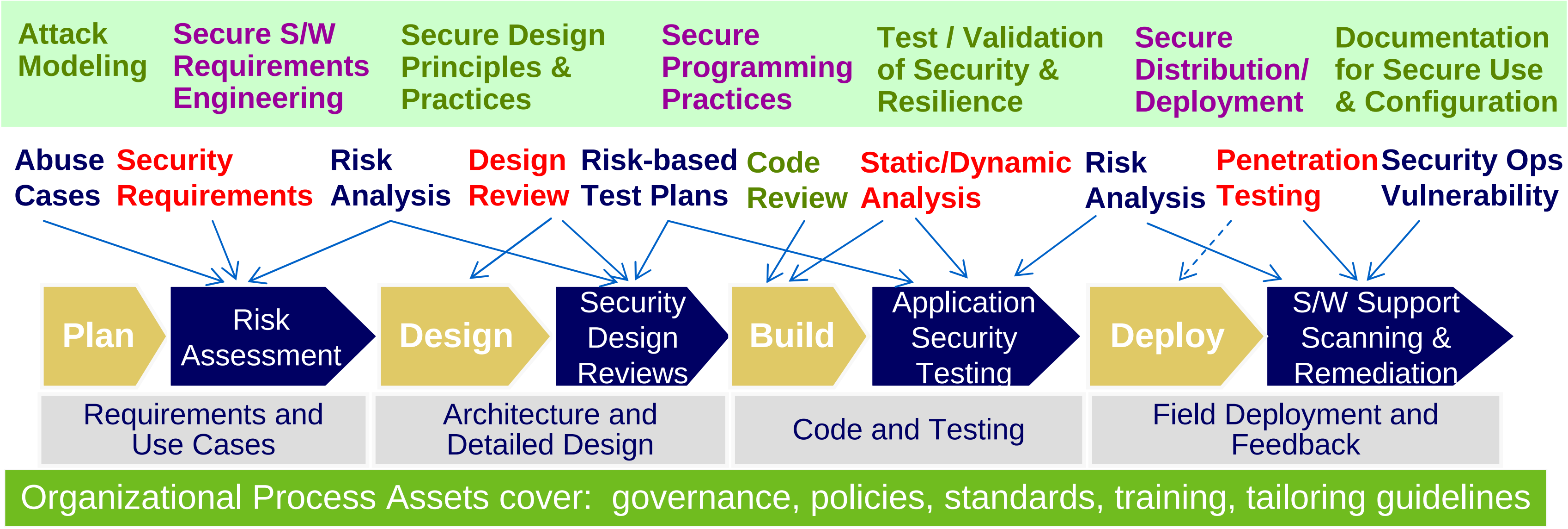
The nation's critical infrastructure (energy, transportation, telecommunications, etc.), businesses, and services are extensively and increasingly controlled and enabled by

See https://buildsecurityin.us-cert.gov/swa/ for information

Security-Enhanced Process Improvements

Organizations that provide security engineering & risk-based analysis throughout the lifecycle will have more resilient software products / systems.

"Build Security In" throughout the lifecycle



Attack Modeling

Secure S/W Requirements Engineering

Secure Design Principles & Practices

Secure Programming Practices

Test / Validation of Security & Resilience

Secure Distribution/ Deployment

Documentation for Secure Use & Configuration

Abuse Cases

Security Requirements

Risk Analysis

Design Review

Risk-based Test Plans

Code Review

Static/Dynamic Analysis

Risk Analysis

Penetration Testing

Security Ops & Vulnerability Mgt

Plan

Risk Assessment

Design

Security Design Reviews

Build

Application Security Testing

Deploy

S/W Support Scanning & Remediation

Requirements and Use Cases

Architecture and Detailed Design

Code and Testing

Field Deployment and Feedback

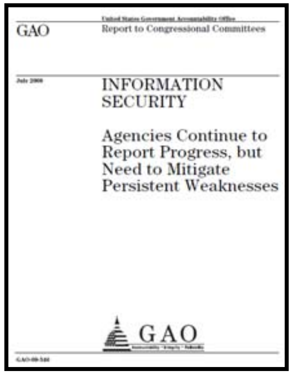
Organizational Process Assets cover: governance, policies, standards, training, tailoring guidelines

- Leverage Software Assurance resources (freely available) to incorporate in training & awareness
- Modify SDLC to incorporate security processes and tools (should be done in phases by practitioners to determine best integration points)
- Avoid drastic changes to existing development environment and allow for time to change culture and processes
- Make the business case and balance the benefits
- Retain upper management sponsorship and commitment to producing secure software.

* Adopted in part from "Software Assurance: Mitigating Supply Chain Risks" (DHS NCSD SwA); "What to Test from a Security Perspective for the QA Professional" (Cigital) and "Neutralizing the Threat: A Case Study in Enterprise-wide Application Security Deployments" (Fortify Software & Accenture Security Technology Consulting)

July 2009 GAO Report on INFORMATION SECURITY:

Agencies Continue to Report Progress, but Need to Mitigate Persistent Weaknesses **(GAO-09-546)**



United States Government Accountability Office

GAO

Report to Congressional Committees

July 2009

INFORMATION SECURITY

Agencies Continue to Report Progress, but Need to Mitigate Persistent Weaknesses

GAO

GAO-09-546

What the Government Accountability Office Reported:

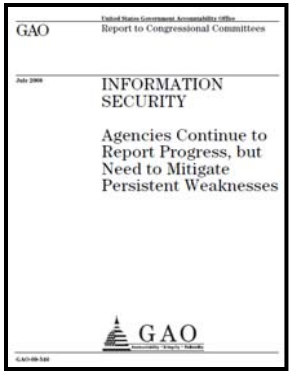
- Persistent weaknesses in information security policies and practices continue to threaten the confidentiality, integrity, and availability of critical information and information systems used to support the operations, assets, and personnel of most federal agencies.

- Recently reported incidents at federal agencies have placed sensitive data at risk, including the theft, loss, or improper disclosure of personally identifiable information of Americans, thereby exposing them to loss of privacy and identity theft.

- For fiscal year 2008, almost all 24 major federal agencies had weaknesses in information security controls.
  - An underlying reason for these weaknesses is that agencies have not fully implemented their information security programs.
  - As a result, agencies have limited assurance that controls are in place and operating as intended to protect their information resources, thereby leaving them vulnerable to attack or compromise.

- In prior reports, GAO has made hundreds of recommendations to agencies for actions necessary to resolve prior significant control deficiencies and information security program shortfalls.

July 2009 GAO Report on INFORMATION SECURITY: Agencies Continue to Report Progress, but Need to Mitigate Persistent Weaknesses **(GAO-09-546)**



United States Government Accountability Office

GAO Report to Congressional Committees

July 2009

INFORMATION SECURITY

Agencies Continue to Report Progress, but Need to Mitigate Persistent Weaknesses

GAO

GAO-09-546

Included recommendations of March 2009 meeting of security experts on how to improve national the nation’s cybersecurity strategy and posture:

- Develop a national strategy that clearly articulates strategic objectives, goals and priorities.
- Establish White House responsibility and accountability for leading and overseeing national cybersecurity policy.
- Establish a governance structure for strategy implementation.
- Publicize and raise awareness about the seriousness of the cybersecurity problem.
- Create an accountable, operational cybersecurity organization.
- Focus more actions on prioritizing assets and functions, assessing vulnerabilities, and reducing vulnerabilities than on developing additional plans.
- Bolster public/private partnerships through an improved value proposition and use of incentives.
- Focus greater attention on addressing the global aspects of cyberspace.
- Improve law enforcement efforts to address malicious activities in cyberspace.
- Place greater emphasis on cybersecurity research and development, including consideration of how to better coordinate government and private-sector efforts.
- Increase the cadre of cybersecurity professionals.
- **Make the federal government a model for cybersecurity, including using its acquisition function to enhance cybersecurity aspects of products and services.**
  - *The strategy establishes securing the government’s cyber space as a key priority and advocates using federal acquisition to accomplish this goal.*
  - Although the federal government has taken steps to improve the cyber security of agencies (e.g., beginning to implement the CNCI initiatives), the GAO panel of experts indicated it still is not a model for cyber security; it has not made changes in its acquisition function and the training of government officials in a manner that effectively improves the cyber security capabilities of products and services purchased and used by federal agencies